



CM-P00072608

ISR RUNNING-INRun 93 - 28 July 1971 - 16.00 to 18.00 h22 GeV/c - 20 bunches - Ring 1 - 22 FACritical current and equilibrium pressure with twin stackExperimental conditions:

- Stacking at the bottom to +40 mm.
- All gauges were set to 10^{-7} torr max., with the exception of the 4 showing the largest pressure rises, which were set to 10^{-6} torr max. and connected to 4 recorders. These gauges were: 149.6; 317.6; 451; 733.6.

Gauge 317.6, which was showing the highest pressure during the last stack, was also connected to the dual trace recorder together with the PIDC.

- Fast printouts of pressure at all gauges and a punched tape record of all pumps at high currents were obtained. Pictures of the pressure display from all gauges were taken by E. Fischer at some of the current steps.

All above records are in the file.

(Three gauges switched off at 10^{-7} torr at peak currents: they are 133.1; 149.1; 317.1.)

The purpose of the experiment was to compare critical currents and pressure rises in a twin stack and in a normal stack, made under the same conditions. Both stacks were made in current steps of the same approximate height, the difference between them being that, in the case of the twin stack, 60 empty pulses were inserted after the first step at 3 A.

The initial average pressure for the twin stack had been set at $5 \cdot 10^{-10}$ torr, by waiting a few minutes after dumping a test stack of 6.3 A, in the hope that such a pressure could be reached

again in a short time after dumping the twin stack, before starting the normal stack to be used for comparison. Unfortunately, this did not happen and, not having time to wait any longer, the comparison stack had to be started at $7.5 \cdot 10^{-10}$ torr average pressure. Moreover, in the case of the normal stack, the duration of the steps had to be somewhat shortened. In both cases it was not possible to wait for the pressure to become constant after each step, but we could wait at least long enough to make sure that it was levelling off.

The values reached by the average gauge pressures and by the pressure of gauge 317.6 in correspondence with the current steps are given in Tables 1 and 2 for the twin stack and the normal stack, respectively, together with the current decay rates. For the low currents, the pressure readings have been taken from the fast printer output, for the highest ones from pictures of the gauge display. The last line of each table does not correspond to a plateau, but shows the values of average pump pressure and of gauge 317.6 pressure corresponding to the maximum currents reached in the 2 stacks.

The average pressures reached at the end of the successive steps in current are plotted in Figure 1. Figure 2 shows the ratio of the increase in current at each step to the corresponding percentage increase in average pressure. Extrapolating the two curves would give values of the critical current of 5.65 A and 5.05 A for the twin stack and the normal stack, respectively. The comparison, however, cannot be considered conclusive, on account of the different initial conditions and time intervals for the two stacks.

In any case, the stability of the twin stack at high currents is interesting. A significant result is also the fact that in both cases the critical current was above 5 A, and that the decay rate was lower than $2 \cdot 10^{-4} \text{ min}^{-1}$ up to 4.6 A. This improvement with respect to previous conditions may be related to the "vacuum cleaning" of run 91.

L. Resegotti

Note - A puzzling decrease in pressure was shown by gauges 149.6; 317.6 and 733.6 at 4.97 A in the normal stack, although the current decay rate was only $4 \cdot 10^{-3} \text{ min}^{-1}$ (Fig. 3). The PUPI record of average pump pressure does not show a corresponding decrease.

Distribution:

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TABLE 1

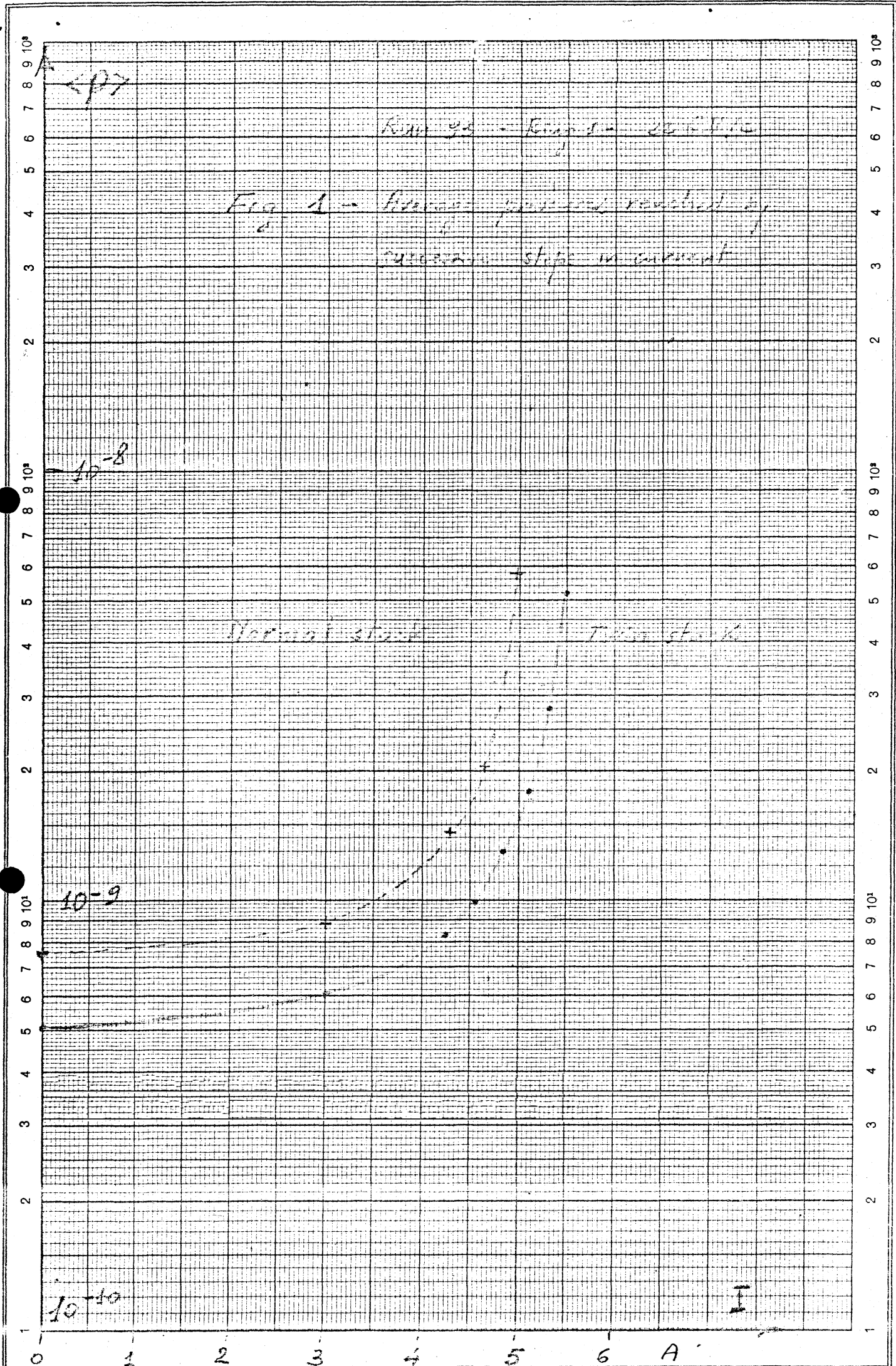
Decay rates and pressures during twin stack

Current (A)	decay rate (min ⁻¹)	average pressure (torr)	VG 317.6 pressure (torr)	record
0	---	5.1 10 ⁻¹⁰	5.6 10 ⁻⁹	FP
3.01	<3.0 10 ⁻⁵	6.1 10 ⁻¹⁰	8.0 10 ⁻⁹	FP
4.25	5.0 10 ⁻⁵	8.3 10 ⁻¹⁰	1.4 10 ⁻⁸	FP
4.54	1.2 10 ⁻⁴	9.9 10 ⁻¹⁰	1.8 10 ⁻⁸	FP
4.82	1.7 10 ⁻⁴	1.3 10 ⁻⁹	2.6 10 ⁻⁸	FP
5.09	4.0 10 ⁻⁴	1.8 10 ⁻⁹	3.7 10 ⁻⁸	FP
5.32	1.0 10 ⁻³	2.8 10 ⁻⁹	6.0 10 ⁻⁸	DSVG
5.50	4.0 10 ⁻³	5.2 10 ⁻⁹	1.0 10 ⁻⁷	DSVG
(5.89 peak)		4.0 10 ⁻⁸	3.0 10 ⁻⁷	PUPI + pen

TABLE 2

Decay rates and pressures during normal stack

Current (A)	decay rate (min ⁻¹)	average pressure (torr)	VG 317.6 pressure (torr)	record
0	---	7.6 10 ⁻¹⁰	7.5 10 ⁻⁹	FP
3.02	3.0 10 ⁻⁵	8.9 10 ⁻¹⁰	1.0 10 ⁻⁸	FP
4.29	1.0 10 ⁻⁴	1.5 10 ⁻⁹	2.2 10 ⁻⁸	FP
4.64	1.6 10 ⁻⁴	2.1 10 ⁻⁹	3.4 10 ⁻⁸	FP
4.97	4.0 10 ⁻³	5.8 10 ⁻⁹	8.0 10 ⁻⁸	DSVG
(6.12 peak)		3.1 10 ⁻⁸	> 10 ⁻⁶	PUPI + pen



A $\frac{dI}{dt}$
APP

Run 53

Run 1

Run 2

Fig. 2 - Plot of impedance of circuit

of parallel resonant circuit with standard

4

5

3

2

Normalized to 1

1

2

3

4

5

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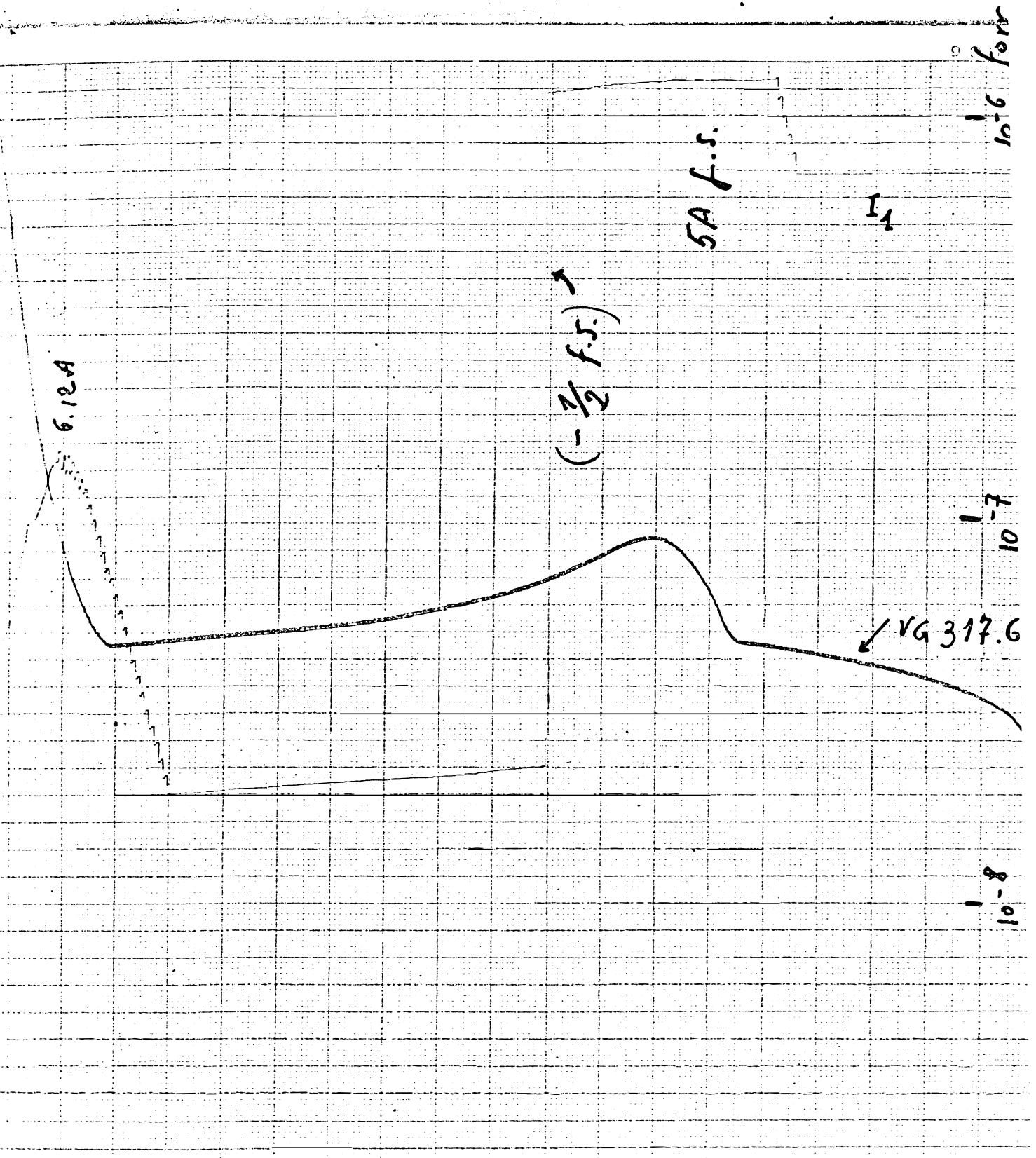
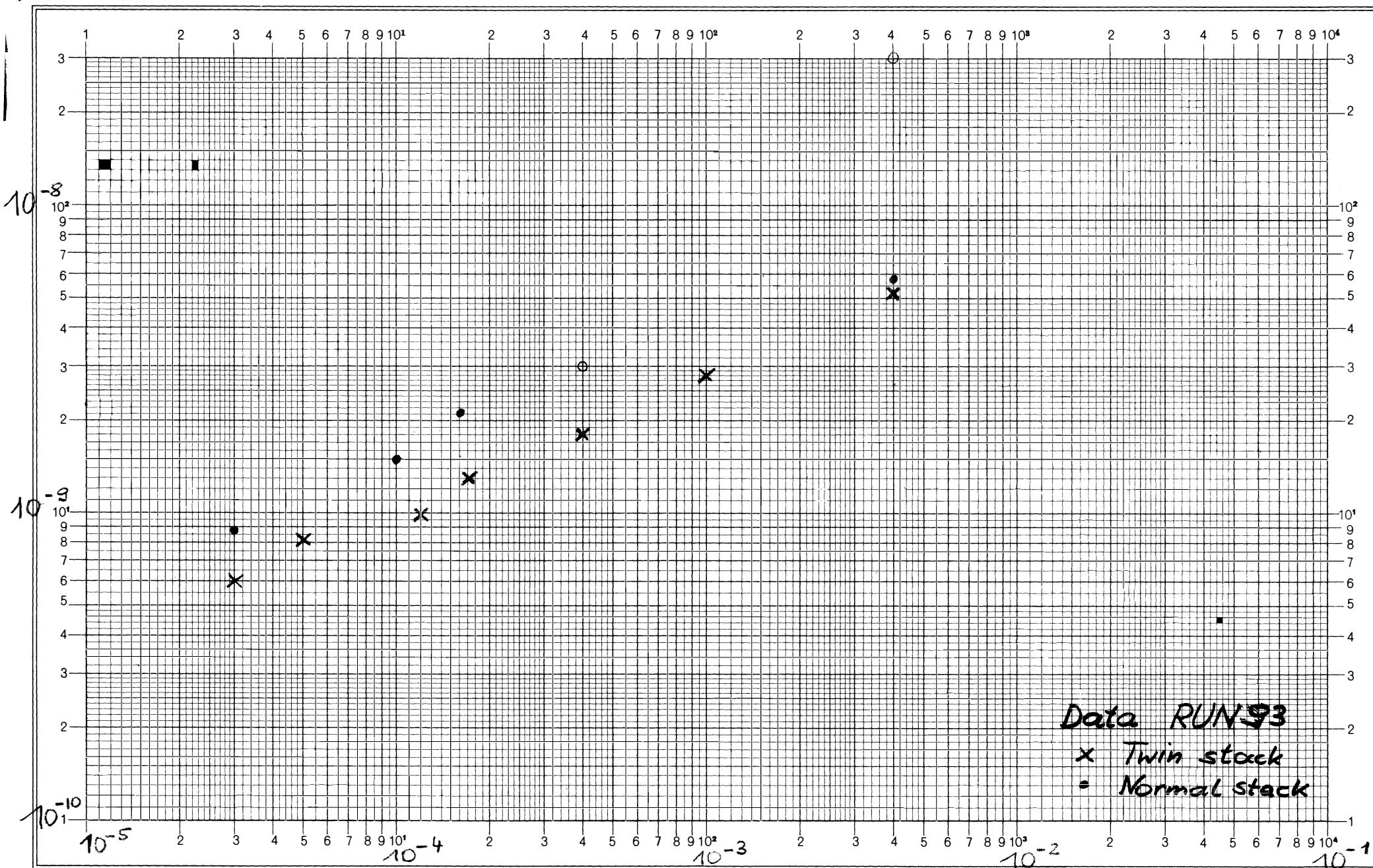


fig 3 - End of "normal" stack in steps

← 25 mm/min

↳ Torr

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Data RUN 93
 x Twin stack
 . Normal stack

Logar. Teilung } 1-300 u. 1-10000 Einheit } 62,5 mm
 Division } Unité }

Ed. Aerni-Leuch, Bern, Nr. 551

→ Decay rate